

# AMC XO

8 Zone 8 Source Audio Digital Home System

# XOi

4 Zone 4 Source Audio Digital Home System

# X86

6 Zone 8 Source Audio / Video Digital Home System

## RS-485 Manual

AMC XNET-11 MODULE

RS-485 ↔ RS-232 Gateway Interface Module

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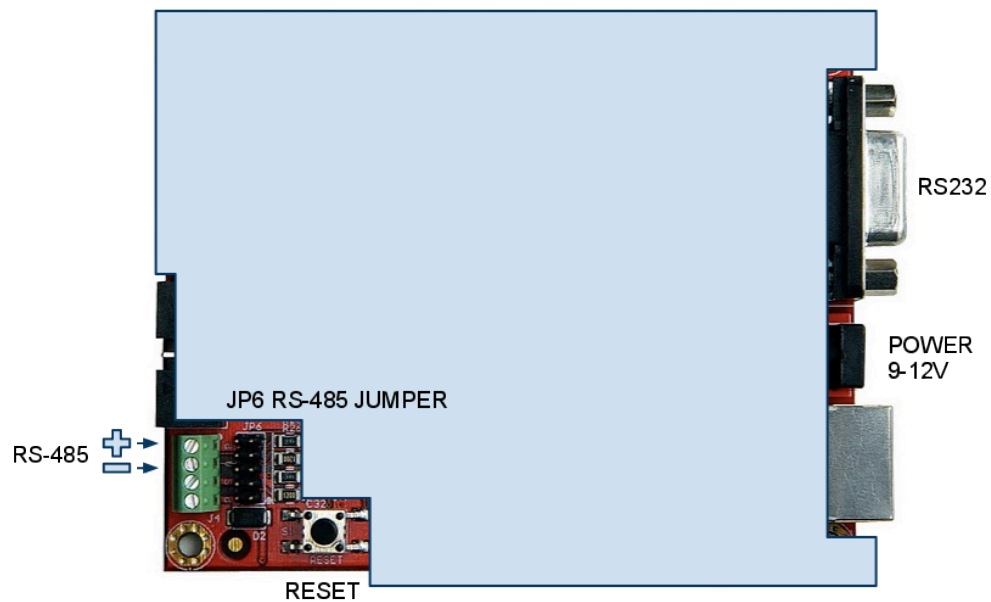
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# Hardware Specifications

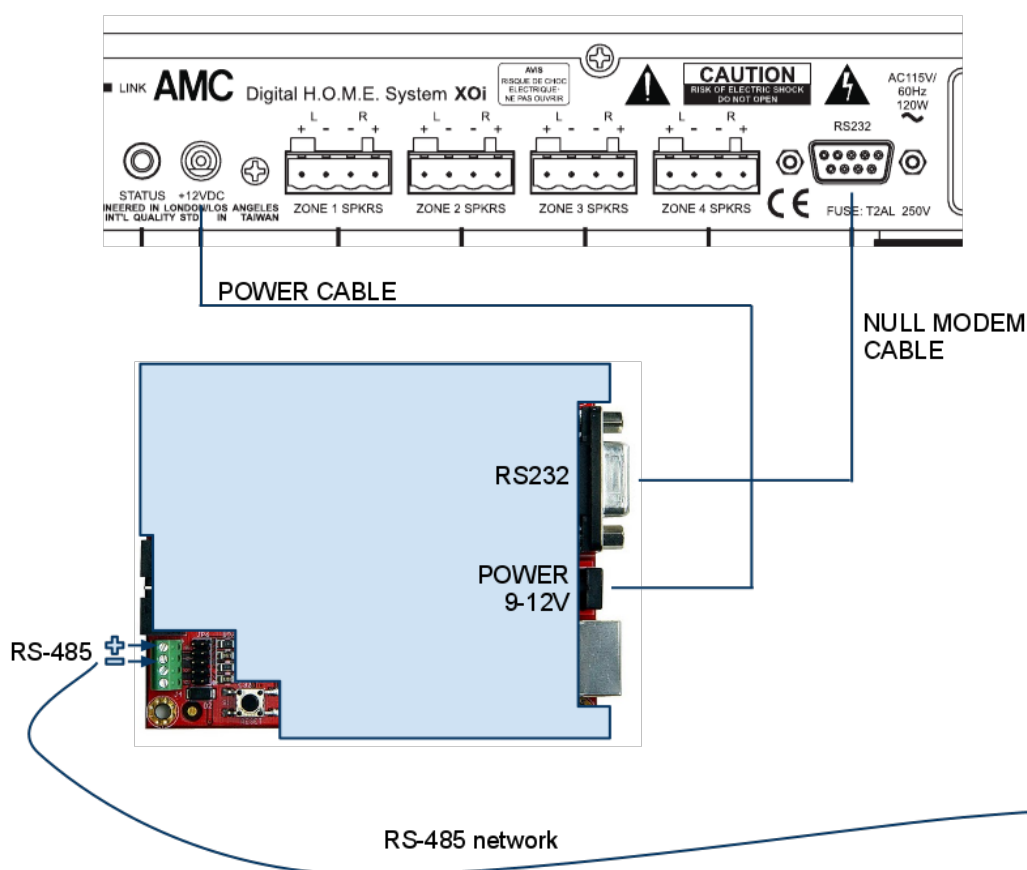
## Gateway Module Specifications

- XNET-11 - RS-232/RS-485 Gateway Interface:
  - RS-485 port x1
  - RS-232 port x1
  - Power: 9-12VDC
- XNET-11 Parts:
  - XNET-11 module x1
  - DB9 FEMALE-MALE cable x1
  - DB9 NULL MODEM FEMALE-FEMALE adapter x1
  - POWER connector cable (barrel connectors on both sides) x1

## Gateway Module Diagram



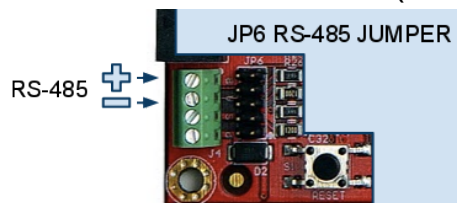
## Gateway Module Connection Diagram



## Serial Port Specifications

### Serial Port Hardware

- RS-232  
DB-9 Female (DCE)
- RS-485  
Screw Terminal Block  
4 contacts and 2 contacts used (labeled A / B or + / -)



## Serial Port Communication Protocol

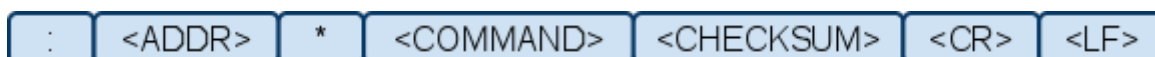
- RS-232  
RS-232 asynchronous serial communication  
38400 bps, 8 bits, 1 stop bit, no parity  
no flow control
- RS-485  
RS-485 asynchronous serial communication  
Two-Wire Half Duplex  
38400 bps, 8 bits, 1 stop bit, no parity  
no flow control

# Command Set Specifications

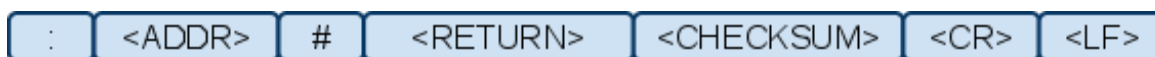
## Command Set Format

- ASCII format is used for all characters in the command set
- All RS-485 commands start with a MESSAGE START BYTE, ":" or colon sign, and followed by DEVICE ADDRESS
- DEVICE ADDRESS - 2 bytes ASCII address (valid ranges: 00 - FF hex represented in ASCII with 2 bytes)
- Following DEVICE ADDRESS is "\*" (asterisk) character is used for the COMMAND START BYTE
- All commands end with <CR> and <LF> characters (0D and 0A hexadecimal)
- Multiple commands require a delay of 500ms between commands

## COMMAND



## RETURN



## ERROR RETURN



: = MESSAGE START BYTE

<ADDR> = 2 bytes ASCII address (RS-485 address of this module)

\* = COMMAND START BYTE

# = RETURN START BYTE

<CHECKSUM> = LRC checksum

<CR> = ASCII value 0D hex

<LF> = ASCII value 0A hex

## LRC Checksum Generation

Add all bytes in the message, excluding the starting colon and ending CR/LF

Subtract the added value from FF hex to generate 1's complement

Add 1 to produce 2's complements

LRC example C function code:

```
void lrc_generate(char *LRC, char *buffer) {
    int i;
    int len;
```

```

    unsigned char lrc;

    len = strlen(buffer);
    lrc = 0x00;
    for (i=0; i<len; i++) {
        lrc = lrc + buffer[i];
    }
    lrc = -lrc;    // 2's compliments
    sprintf(LRC, "%02X", lrc);
}

```

## Zone Number Range

- XO: 01-08
- XOi: 01-04
- X86: 01-08

## Source Select Range

- XO: 01-08
- XOi: 01-04
- X86: 01-06

# Standard Status Feedback Format

## Status Feedback Conditions

- Most commands send to the system will receive this type of Status Feedback unless specified explicitly

## Status Feedback Format

RETURN	ZNaa,SRcbb,GRPc,VOL-dd
RETURN PARAMETERS	aa = Zone Number bb = Source Select c = 0 (Group Mode Off), 1 (Group Mode On) dd = dBs of attenuation (00 – 62 where 62=mute)

# Command Reference

## Zone Status

ACTION	Zone Status Command returns status information on the given zone
COMMAND	ZnnSTA00
COMMAND PARAMETERS	nn = Zone Number
RETURN	Standard Status Feedback Format
RETURN PARAMETERS	

## Tone Control Settings

ACTION	Return tone control settings on the given zone
COMMAND	ZNnnSET00
COMMAND PARAMETERS	nn = Zone Number
RETURN	ZNaa,BASSbb,TREBbb,GRPc
RETURN PARAMETERS	aa = Zone Number bb = EQ level +/- 8,6,4,0 c = 0 (Group Mode Off), 1 (Group Mode On)

## Power OFF

ACTION	Power OFF the given zone (turn off ALL zones in group mode and leave group mode)
COMMAND	ZNnnPWR00
COMMAND PARAMETERS	nn = Zone Number
RETURN	Standard Status Feedback Format
RETURN PARAMETERS	

**Power ON**

ACTION	Power ON the given zone (restore last select source and volume level)
COMMAND	ZNnnPWR01
COMMAND PARAMETERS	nn = Zone Number
RETURN	Standard Status Feedback Format
RETURN PARAMETERS	

**Power Toggle**

ACTION	Toggle between power On/Off for the given zone
COMMAND	ZNnnPWR02
COMMAND PARAMETERS	nn = Zone Number
RETURN	Standard Status Feedback Format
RETURN PARAMETERS	

**All Zones OFF**

ACTION	Turn off ALL Zones
COMMAND	ZALLPWR00
COMMAND PARAMETERS	
RETURN	ZALLOFF
RETURN PARAMETERS	

**Un-mute all Zones**

ACTION	Disable mute for ALL Zones
COMMAND	ZALLMUT00

COMMAND PARAMETERS	
RETURN	ZALLMOFF
RETURN PARAMETERS	

### Mute all Zones

ACTION	Apply mute for ALL Zones
COMMAND	ZALLMUT01
COMMAND PARAMETERS	
RETURN	ZALLMON
RETURN PARAMETERS	

### Source Select

ACTION	Change a input source for the given zone
COMMAND	ZNnnSRCss
COMMAND PARAMETERS	nn = Zone Number ss = Input Source
RETURN	Standard Status Feedback Format
RETURN PARAMETERS	

### Adjust Volume

ACTION	Adjust volume for the given zone
COMMAND	ZNnnVOLw
COMMAND PARAMETERS	nn = Zone Number vw = Volume Level (00 - 62 where 62=mute)
RETURN	Standard Status Feedback Format
RETURN PARAMETERS	

**Volume Up 1dB**

ACTION	Step volume up 1dB for given zone
COMMAND	ZNnnVOLUP
COMMAND PARAMETERS	nn = Zone Number
RETURN	Standard Status Feedback Format
RETURN PARAMETERS	

**Volume Down 1dB**

ACTION	Step volume down 1dB for given zone
COMMAND	ZNnnVOLDN
COMMAND PARAMETERS	nn = Zone Number
RETURN	Standard Status Feedback Format
RETURN PARAMETERS	

**Zone Mute OFF**

ACTION	Disable mute for the given zone with last volume preserved
COMMAND	ZNnnMUT00
COMMAND PARAMETERS	nn = Zone Number
RETURN	Standard Status Feedback Format
RETURN PARAMETERS	

**Zone Mute ON**

ACTION	Apply mute for the given zone and memorize the current volume
COMMAND	ZNnnMUT01

COMMAND PARAMETERS	nn = Zone Number
RETURN	Standard Status Feedback Format
RETURN PARAMETERS	

### Adjust Bass

ACTION	Adjust Bass by +/- 0,4,6,8 dB
COMMAND	ZNnnBASsn
COMMAND PARAMETERS	nn = Zone Number s = + or - sign n = Bass Adjustment Level (0,4,6,8)
RETURN	ZNaa,BASSbb,TREBbb,GRPc
RETURN PARAMETERS	aa = Zone Number bb = EQ level +/- 8,6,4,0 c = 0 (Group Mode Off), 1 (Group Mode On)

### Adjust Treble

ACTION	Adjust Treble by +/- 0,4,6,8 dB
COMMAND	ZNnnTRBsn
COMMAND PARAMETERS	nn = Zone Number s = + or - sign n = Treble Adjustment Level (0,4,6,8)
RETURN	ZNaa,BASSbb,TREBbb,GRPc
RETURN PARAMETERS	aa = Zone Number bb = EQ level +/- 8,6,4,0 c = 0 (Group Mode Off), 1 (Group Mode On)

### Group Mode OFF

ACTION	Disable Group Mode
COMMAND	ZALLGRP00
COMMAND PARAMETERS	

RETURN	GRPOFF
RETURN PARAMETERS	

**Group Mode ON**

ACTION	Activate Group Mode
COMMAND	ZALLGRPss
COMMAND PARAMETERS	ss = Input Source for this group (01 - 04/08)
RETURN	GRPON,STC <sub>ss</sub>
RETURN PARAMETERS	ss = Input Source selected for this group

# Firmware Upgrade

## Requirements

Make sure the module is still connected to the power source either provided by 12VDC connection from the back of AMC units or with a power adapter (9-12VDC)  
Connect the module's RS-232 port to a PC:

With a USB / RS-232 adapter cable - connect the RS-232 DB9 MALE side of the cable to XNET's RS232 port

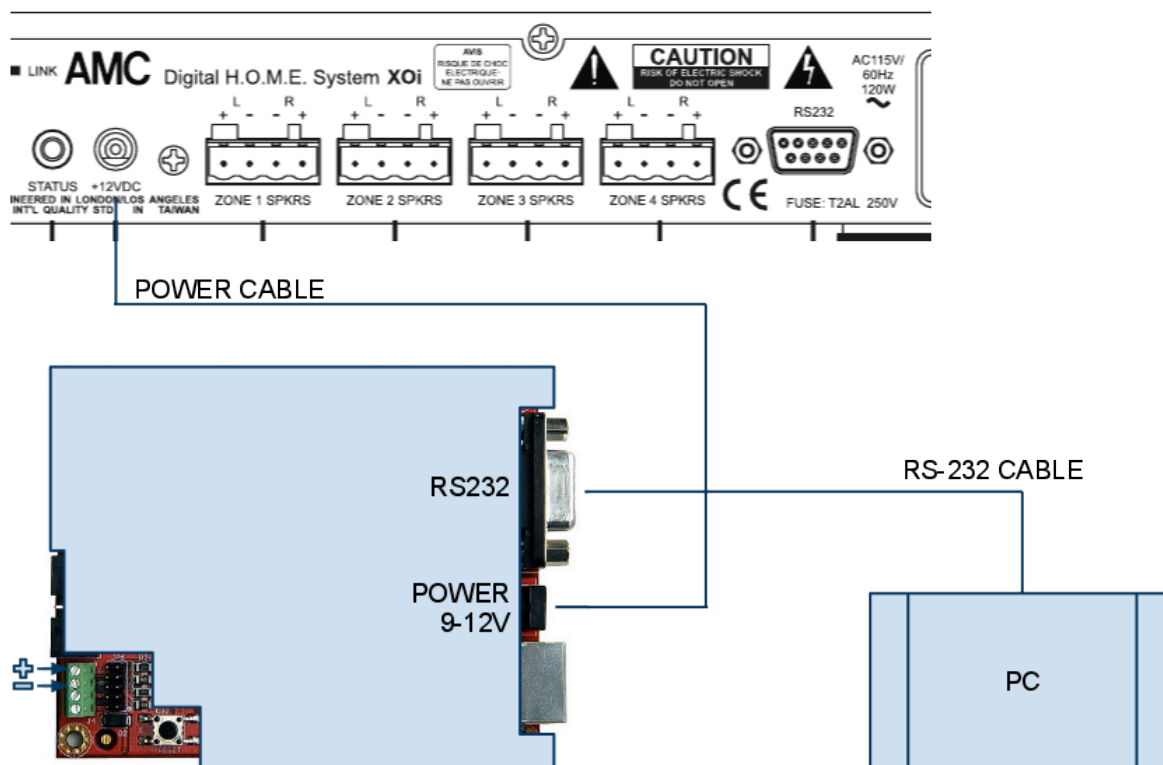
With a RS-232 DB9 cable - connect the RS-232 DB9 MALE side of the cable to XNET's RS232 port

Download Programming Software:

Download and install AVR Studio from Atmel's website

Download and install avrdude command line tool (multi-platform)

## Hardware Connection Diagram



## Firmware Upgrade Instructions

Setup the programming tools with the following parameters:

Processor: ATmega128

Programmer Type: STK500 (or AVRISP)

Programmer Port: COM# (or /dev/ttyUSB#) - Port # depending on the hardware setup

Starting Firmware Upgrade:

Press RESET on the XNET and,

START programming within 3 seconds after releasing the RESET button

Press RESET again when programming process completed in order to run the updated firmware